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ABSTRACT

This document contains two learning activity packets (LAPs) for the "hand and bench work" instructional area of a Machine Shop I course. The two LAPs cover the following topics: hand and bench work and pedestal grinder. Each LAP contains a cover sheet that describes its purpose, an introduction, and the tasks included in the LAP; learning steps (checklist); and various assignment sheets. Materials are illustrated with line drawings. The LAPs are referenced to a curriculum guide for the Machine Shop I course. (KC)

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ED279818

Learning Activity Packets (LAPs)

Machine Shop I

Section C — Hand and Bench Work

LAP #11 — Hand and Bench Work
LAP #12 — Pedestal Grinder

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State Department of Vocational and Technical Education CIMC Stillwater, Oklahoma LEARNING ACTIVITY PACKETS

for MACHINE SHOP I

LAP NO. _____ CODE: _____

MAJOR INSTRUCTIONAL AREA

HAND AND BENCH WORK

INSTRUCTIONAL UNIT

HAND TOOLS
SECTION C--UNIT I

LEARNING ACTIVITY PACKET NO.

11

PREREQUISITE LAP(S)

1, 2, 3, 4, 5

PURPOSE: This Learning Activity Packet (LAP) outlines the study activities and performance tasks for "Hand Tools." Accomplishing these procedures will aid the student in attaining a working knowledge of this area of training and in achieving a SKILLED or MODERATELY SKILLED competency level in the performance of jobs associated with this specialty.

INTRODUCTION: The course of study in this LAP will help the student become able to identify and use basic hand tools and state safety rules that should be observed when using hand tools.

TASKS INCLUDED IN THIS LAP:

1. Use a hand hacksaw
2. Use a file to square a part to size
3. Perform layout with a combination square set
4. Hacksaw to layout
5. File to layout
6. Produce internal threads by hand tapping
7. Produce external threads with hand die
8. Assemble C-clamp

MACHINE SHOP I
HAND TOOLS
SECTION C--UNIT I

LEARNING STEPS

Check the Following
Blanks as You Complete
The Required Steps.

_____1.	Read	Unit and Specific Objectives, page 1-C.
_____2.	Complete	Hand Tools Pre-Test, LAP page 9.
_____3.	Study	The sections of the Information Sheet, pages 5-C through 26-C, indicated by your instructor on your Pre-Test.
_____4.	Refer	To Step 10 of your Pre-Test. If additional study is indicated for any of Sections I, II, III, V, or VI continue to Step 5. Otherwise, proceed to Step 7.
_____5.	Do	LAP Assignment Sheet #1, LAP page 31.
_____6.	Do	LAP Assignment Sheet #2, LAP page 43.
_____7.	Refer	To Step 10 of your Pre-Test. If additional study is indicated for Section IV, continue to Step 8. Otherwise, proceed to Step 11.
_____8.	Do	Assignment Sheet #1--Complete Hand Tool Safety Test, page 27-C.
_____9.	Stop.	Have your instructor evaluate Assignment Sheet #1. If you score 100 percent, proceed to Step 11. Otherwise, continue to Step 10.

_____10. Do LAP Assignment Sheet #3, LAP page 59.

_____11. Refer To Step 10 of your Pre-Test. If additional study is indicated for Section V, continue to Step 12. Otherwise, proceed to Step 15.

_____12. Do Assignment Sheet #2--Determine Tap Drill Size, page 29-C.

_____13. Stop. Have your instructor evaluate Assignment Sheet #2. If your instructor is satisfied with your performance, proceed to Step 15. Otherwise, continue to Step 14.

_____14. Do LAP Assignment Sheet #4, LAP page 61.

_____15. Check The tasks below which you feel that you can perform without supervision.

Student Check		Instructor Initials/Date	
		Skilled	Moderately Skilled
_____a.	Use a hand hacksaw (18).	_____	_____
_____b.	Use file to square a part to size (23).	_____	_____
_____c.	Perform layout with combination square set (28).	_____	_____
_____d.	Hacksaw to layout (34).	_____	_____
_____e.	File to layout (41).	_____	_____
_____f.	Produce internal threads by hand tapping (46).	_____	_____
_____g.	Produce external threads with hand die (52).	_____	_____
_____h.	Assemble C-clamp (58).	_____	_____

_____16. Discuss Your competency in each task with your instructor. Your instructor will initial each task in which you demonstrate sufficient competency. If all tasks have been initialed, proceed to Step 64. Otherwise, continue to Step 17.

_____17. Refer To Step 15a. If this task has been initialed, proceed to Step 22. Otherwise, continue to Step 18.

_____18. Study Job Sheet #1--Use a Hand Hacksaw, page 37-C.

_____19. Do Job Sheet #1--Use a Hand Hacksaw.

_____20. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, proceed to Step 22. Otherwise, repeat Steps 18 and 19 and then go to Step 21.

_____21. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, continue to Step 22. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to Step 22.

_____22. Refer To Step 15b. If this task has been initialed, proceed to Step 27. Otherwise, continue to Step 23.

_____23. Study Job Sheet #2--Use File to Square a Part to Size, page 43-C.

_____24. Do Job Sheet #2--Use File to Square a Part to Size.

_____25. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, proceed to Step 27. Otherwise, repeat Steps 23 and 24 and then go to Step 26.

_____26. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, continue to Step 27. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to Step 27.

_____27. Refer To Step 15c. If this task has been initialed, proceed to Step 33. Otherwise, continue to Step 28.

_____28. Study Job Sheet #3--Perform Layout with Combination Set, page 49-C.

_____29. Watch Slide/Tape Presentation "Perform Layout with Combination Set" (C-I-3).

_____30. Do Job Sheet #3--Perform Layout with Combination Set.

_____31. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, proceed to Step 33. Otherwise, repeat Steps 28-30 and then go to Step 32.

_____32. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, continue to Step 33. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to Step 33.

NOTE: Job Sheets 4 through 8 outline the production of a C-clamp, step-by-step. If your skill level allows you to skip some of these Job Sheets, talk with your instructor about the use of different workpieces and other changes that may be required in the Job Sheets you do accomplish.

_____33. Refer To Step 15d. If this task has been initialed, proceed to Step 39. Otherwise, continue to Step 34.

_____34. Study Job Sheet #4--Hacksaw to Layout, page 55-C.

_____35. Watch Slide/Tape Presentation "Hacksaw to Layout" (C-I-2).

_____36. Do Job Sheet #4--Hacksaw to Layout.

_____37. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, proceed to Step 39. Otherwise, repeat Steps 34-36 and then go to Step 38.

_____38. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, continue to Step 39. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to Step 39.

_____39. Refer To Step 15a. If this task has been initialed, proceed to Step 45. Otherwise, continue to Step 40.

_____40. Study Job Sheet #5--File to Layout, page 59-C.

_____41. Watch Slide/Tape presentation "File to Layout" (C-I-5).

_____42. Do Job Sheet #5--File to Layout.

_____43. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, proceed to Step 45. Otherwise, repeat Steps 40-42 and then go to Step 44.

_____44. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, continue to Step 45. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfacton, continue to Step 45.

_____45.	Refer	To Step 15f. If this task has been initialed, proceed to Step 51. Otherwise, continue to Step 46.
_____46.	Study	Job Sheet #6--Produce Internal Threads by Hand Tapping, page 61-C.
_____47.	Watch	Slide/Tape presentation "Produce Internal Threads by Hand Tapping."
_____48.	Do	Job Sheet #6--Produce Internal Threads by Hand Tapping.
_____49.	Stop.	Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, proceed to Step 51. Otherwise, repeat Steps 46-48 and then go to Step 50.
_____50.	Stop.	Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, continue to Step 51. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to Step 51.
_____51.	Refer	To Step 15g. If this task has been initialed, proceed to Step 57. Otherwise, continue to Step 52.
_____52.	Study	Job Sheet #7--Produce External Threads with Hand Die, page 63-C.
_____53.	Watch	Slide/Tape presentation "Produce External Threads with Hand Die" (C-I-7).
_____54.	Do	Job Sheet #7--Produce External Threads with Hand Die.

_____55. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, proceed to Step 57. Otherwise, repeat Steps 52-54 and then go to Step 56.

_____56. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, continue to Step 57. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to Step 57.

_____57. Refer To Step 15h. If this task has been initialed, proceed to Step 63. Otherwise, continue to Step 58.

_____58. Study Job Sheet #8--Assemble C-Clamp, page 67-C.

_____59. Watch Slide/Tape presentation "Assemble C-Clamp" (C-I-8).

_____60. Do Job Sheet #8--Assemble C-Clamp.

_____61. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, proceed to Step 63. Otherwise, repeat Steps 58-60 and then go to Step 62.

_____62. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, continue to Step 63. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to Step 63.

_____63. Refer To Step 15. If all tasks have been initialed, continue to Step 64. Otherwise, refer to the step indicated in parentheses after the unsigned task.

_____64. Refer To Step 11 of your Pre-Test. If additional study is indicated for "Plan Procedures," continue to Step 65. Otherwise, proceed to Step 68.

_____65. Do — Assignment Sheet #3--Plan Procedures for Completing Shop Projects, page 31-C.

_____66. Stop. — Have your instructor evaluate Assignment Sheet #3. If your instructor is satisfied with your performance, proceed to Step 68. Otherwise, continue to Step 67.

_____67. Do — LAP Assignment Sheet #5, LAP page 63.

_____68. Review — Information Sheet (page 5-C) and Assignment Sheets 1-3.

_____69. Take — Hand Tools Unit I Test (see your instructor). If your score is 85 percent or above, continue to the next Learning Activity Packet. If you do not score 85 percent or above, ask your instructor about additional study requirements and possible re-testing.

HAND TOOLS
UNIT I

PRE-TEST

NAME_____ SCORE_____

DIRECTIONS: This test is to determine how much you already know about hand tools. Your performance on this test will not be used to determine your grade in the course. Instead, it will guide your instructor in designing this course to meet your needs. Answer only those questions for which you know the answer. Guessing may prevent you from receiving the lessons which are required.

1. Match terms associated with hand tools to the correct definitions. Write the correct numbers in the blanks provided.

_____a.	Easy to break	1. Chipping
_____b.	Producing a chip by using a chisel	2. Mushroom
_____c.	An angled surface	3. Tang
_____d.	The pointed end of a file	4. Shearing
_____e.	Process of making metal resistant to wear	5. Drawfiling
_____f.	The enlarged area on the end of a chisel, caused by striking it with a hammer	6. Burr
_____g.	The sharp edge left on a metal part from a machining operation	7. Hardening
_____h.	The cutting action of a tool	8. Brittle
_____i.	Harm to an individual	9. Personal injury
_____j.	A semi-precision steel rule with graduations	10. Reference surface
_____k.	Pushing and pulling a file sideways along the work	11. Tap drill size
_____l.	The side from which dimensions are taken or made	12. Threading die
_____m.	Tool used to produce external threads	13. Scale
_____n.	The size a hole is drilled for a specific size tap	14. Layout solution
_____o.	A thin, colored lacquer that is painted or sprayed on the surface of a part so layout lines can be seen clearly	15. Chamfer

2. Label non-cutting hand tools with their appropriate name and use. Write the correct names and descriptions in the blanks.

a.

_____

Use -- _____

_____

_____

b.

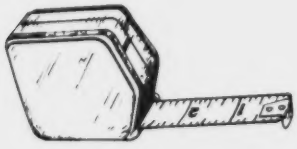
_____

Use -- _____

_____

_____

c.



_____

Use -- _____

_____

_____

d.

_____

Use -- _____

_____

_____

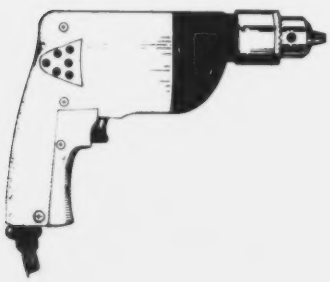
e.

Use -- _____

_____

_____

f.

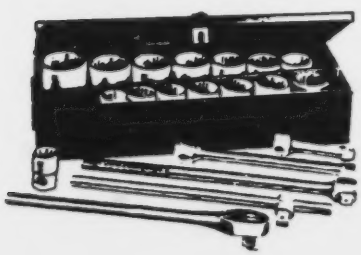


Use -- _____

_____

_____

g.

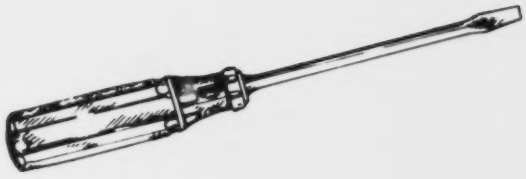


Use -- _____

_____

_____

h.

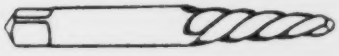


Use -- _____

_____

_____

i.



Use -- _____

_____

_____

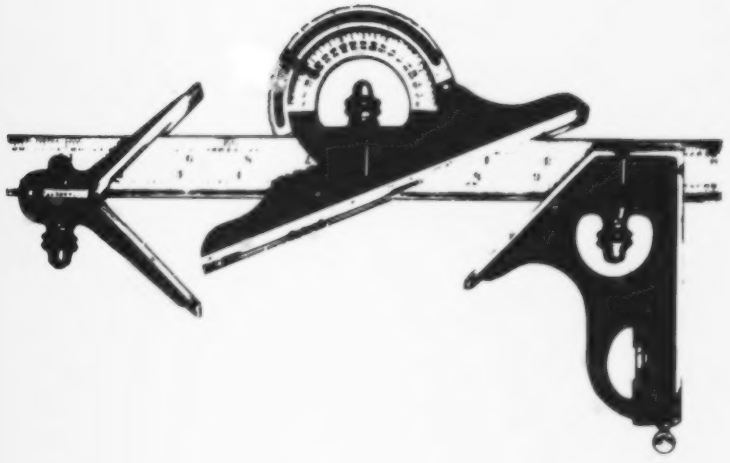
j.

Use -- _____

_____

_____

k.

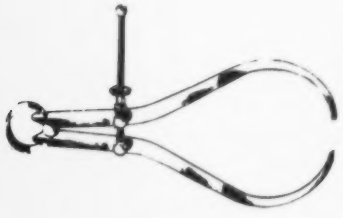


Use -- _____

_____

_____

l.



Use -- _____

_____

_____

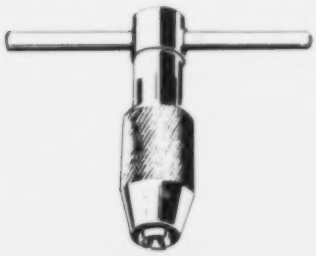
m.

Use -- _____

_____

_____

n.

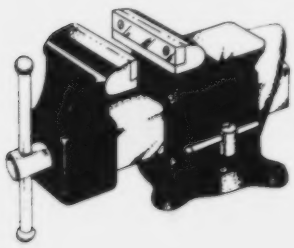


Use -- _____

_____

_____

o.



Use -- _____

_____

_____

p.

Use -- _____

_____

_____

q.

Use -- _____

_____

_____

r.

Use -- _____

_____

_____

s.

_____

Use -- _____

_____

_____

t.

_____

Use -- _____

_____

_____

u.

_____

Use -- _____

_____

_____

v.

Use -- _____

_____

_____

w.

Use -- _____

_____

_____

x.

Use -- _____

_____

_____

y.

Use -- _____

_____

_____

z.

Use -- _____

_____

_____

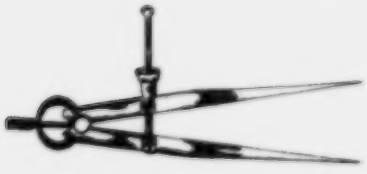
aa.

Use -- _____

_____

_____

bb.



Use -- _____

_____

_____

cc.

Use -- _____

_____

_____

_____

dd.

Use -- _____

_____

_____

_____

ee.

Use -- _____

_____

_____

_____

ff.

Use -- _____

_____

_____

_____

gg.

_____

Use -- _____

_____

_____

hh.

_____

Use -- _____

_____

_____

3. Label cutting hand tools with their appropriate name and use. Write the correct names and descriptions in the blanks.

a.

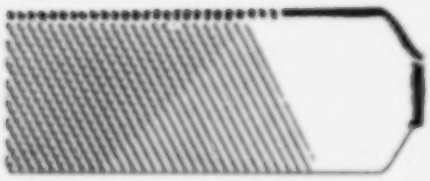
_____

Use -- _____

_____

_____

b.

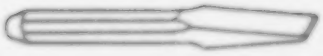


Use -- _____

_____

_____

c.



Use -- _____

_____

_____

d.

Use -- _____

_____

_____

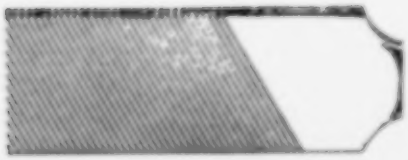
e.

Use -- _____

_____

_____

f.



Use -- _____

_____

_____

g.

Use -- _____

_____

_____

h.

Use -- _____

_____

_____

i.

Use -- _____

_____

_____

j.

Use -- _____

_____

_____

4. State rules for safe use of hand tools.

a. Machinist's bench vise -- _____

_____

_____

_____

_____

_____

_____

b. Wrenches -- _____

_____

_____

_____

_____

_____

_____

c. Pliers -- _____

_____

_____

_____

_____

_____

_____

d. Files -- _____

e. Screwdrivers -- _____

f. Chisels -- _____

g. Cleaning chips from work -- _____

h. Hand hacksaws -- _____

i. General -- _____

j. Hammers -- _____

5. State five rules for care of hand tools in the spaces below.

a. _____

b. _____

c. _____

_____

d. _____

_____

e. _____

_____

6. Describe five reasons for tap failure in the blanks below.

a. _____

_____

b. _____

_____

c. _____

_____

d. _____

_____

e. _____

_____

7. Determine the tap drill size for the following taps from the tap drill chart given. Write the correct answers in the blanks provided.

MACHINE SCREW SIZES UNC and UNF				
NOMINAL SIZE TAP	RECOMMENDED TAP DRILL		PROBABLE HOLE SIZE	% THREAD
	DRILL	DEC.		
0-80	3/64	.0469	.0484	71
1-64	53	.0595	.0610	59
1-72	53	.0595	.0610	67
2-56	50	.0700	.0717	62
2-64	50	.0700	.0717	70
3-48	47	.0785	.0804	69
3-56	46	.0810	.0829	69
4-40	43	.0890	.0910	65
4-48	42	.0935	.0955	61
5-40	38	.1015	.1038	65
5-44	37	.1040	.1063	63
6-32	36	.1065	.1091	71
6-40	33	.1130	.1156	69
8-32	29	.1360	.1389	62
8-36	29	.1360	.1389	70
10-24	26	.1470	.1502	74
10-32	21	.1590	.1622	68
12-24	16	.1770	.1805	66
12-28	15	.1800	.1835	70

FRACTIONAL SIZES UNC and UNF				
NOMINAL SIZE TAP	RECOMMENDED TAP DRILL		PROBABLE HOLE SIZE	% THREAD
	DRILL	DEC.		
1/4-20	7	.2010	.2048	70
1/4-28	3	.2130	.2168	72
5/16-18	F	.2570	.2608	72
5/16-24	I	.2720	.2761	67
3/8-16	5/16	.3125	.3189	72
3/8-24	Q	.3320	.3364	71
7/16-14	U	.3680	.3726	70
7/16-20	25/64	.3906	.3952	65
1/2-13	27/64	.4219	.4266	73
1/2-20	29/64	.4531	.4578	65
9/16-12	31/64	.4844	.4892	68
9/16-18	33/64	.5156	.5204	58
5/8-11	17/32	.5312	.5361	75
5/8-18	37/64	.5781	.5831	58
3/4-10	21/32	.6562	.6612	68
3/4-16	11/16	.6875	.6925	71
7/8-9	49/64	.7656	.7708	72
7/8-14	13/16	.8125	.8177	62
1-8	7/8	.8750	.8809	73
1-12	59/64	.9219	.9279	67

a. #1-24NC_____

b. 1/4-20NC_____

c. 3/4-16NC_____

d. Calculate the following tap drill sizes using the correct shop formula. Show your work.

1) 5/16-18NC for 75% thread = _____

2) 1 1/2-6NC for 65% thread = _____

8. Answer the following questions about hand tool safety.

1. When using a machinist's bench vise, what three things should the user be aware of?

a. _____

b. _____

c. _____

2. Why is it better to use a wrench of the correct size than an adjustable wrench?

_____

_____

3. Is it safer to pull or push a wrench? _____

4. Why should you never strike two hard objects like hammers together?

_____

_____

5. Why should pliers never be used to tighten or loosen nuts or bolts?

_____

_____

6. Why is the tang of a file protected with a file handle? _____

_____

7. What causes the blade of a screwdriver to chip or the head of a screw to be damaged? _____

_____

8. Why should files made of hardened steel never be used as pry bars?

_____

_____

9. Damaged screwdrivers are caused by _____

_____

10. When using a screwdriver it is safer to lay the work on the bench or hold it in a vise rather than holding it in your hand because _____

_____

11. Always store sharp and pointed tools in a place where you will _____

_____

12. Never use a hammer that has a split handle or loose head because

_____

_____

13. What should you do to a chisel that has a mushroomed head to make it safer to use? _____

_____

14. When chipping with a chisel, what should the user always do? _____

_____

15. Why is it safer to use a brush to remove chips from work instead of an air hose? _____

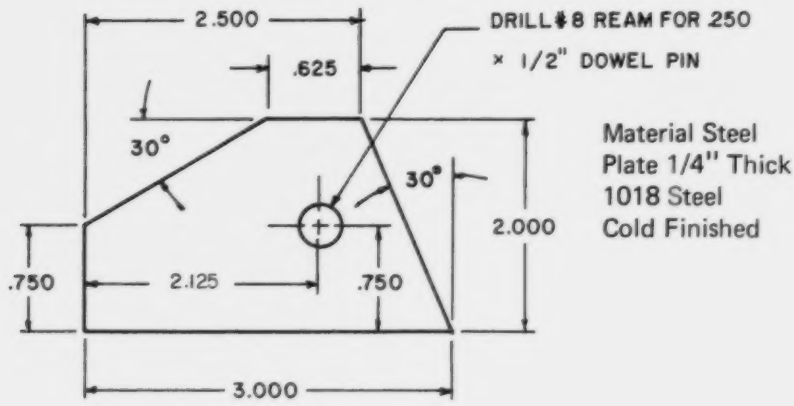
_____

16. When using the hacksaw, hold part in a vise close to jaw, and ease up on the _____ when you are about to cut through so _____ will not strike the vise or work.

17. Reporting all accidents or damaged tools will help _____

_____

9. The following section of the test examines your abilities to plan a job from beginning to end. You will be given the blueprint for a machined part and will be asked to describe how you would go about the production of the part.



A. List the step-by-step procedure you would use to make this part.

_____

_____

_____

_____

_____

_____

_____

_____

B. List the tools required to complete this job.

1. _____ 5. _____

2. _____ 6. _____

3. _____ 7. _____

4. _____ 8. _____

C. Estimate how long it will take to complete this part.

_____

10. Stop. Have your instructor evaluate your test and mark the areas below which require additional study.

Refer to the Information Sheet, Sections:

I_____ V_____

II_____ VI_____

III_____ VII_____

IV_____

You came here from LAP Step 2. If any of the above study areas are checked, return to LAP Step 3. Otherwise, continue to Step 11.

11. _____ Plan procedures

If your instructor has marked this section only or if no sections are marked, proceed to LAP Step 15.

HAND TOOLS
UNIT I

LAP ASSIGNMENT #1--HAND TOOLS

NAME_____ SCORE_____

1. Match these terms associated with hand tools to the correct definitions by selecting the definition which best identifies the term.

   1. Chamfer:

      _____a. A thin, colored lacquer that is painted or sprayed on the surface of a part so layout lines can be seen clearly

      _____b. Producing a chip by using a chisel

      _____c. An angled surface

   2. Layout solution:

      _____a. Process for making metal resistant to wear

      _____b. The size a hole is drilled for a specific size tap

      _____c. A thin, colored lacquer that is painted or sprayed on the surface of a part so layout lines can be seen clearly

   3. Scale:

      _____a. Producing a chip by using a chisel

      _____b. A semi-precision steel rule with graduations

      _____c. The side from which dimensions are taken or made

   4. Threading die:

      _____a. The pointed end of a file

      _____b. Harmful to an individual

      _____c. Tool used to produce external threads

   5. Tap drill size:

      _____a. The size a hole is drilled for a specific size tap

      _____b. Tool used to produce external threads

      _____c. The cutting action of a tool

6. Reference surface:

_____a. An angled surface

_____b. The sharp edge left on a metal part from a machining operation

_____c. The side from which dimensions are taken or made

7. Tap:

_____a. A cutting tool used to cut internal threads

_____b. Tool used to produce external threads

_____c. Pushing and pulling a file sideways along the work

8. Brittle:

_____a. Easy to break

_____b. Producing a chip by using a chisel

_____c. The pointed end of a file

9. Hardening:

_____a. Harm to an individual

_____b. Process of making metal resistant to wear

_____c. The sharp edge left on a metal part from a machining operation

10. Burr:

_____a. The pointed end of a file

_____b. The enlarged area on the end of a chisel caused by striking it with a hammer

_____c. The shape edge left on a metal part from a machining operation

11. Drawfiling:

_____a. Process of making metal resistant to wear

_____b. Pushing and pulling a file sideways along the work

_____c. The side from which dimensions are taken or made

12. Shearing:

_____a. The cutting acton of a tool

_____b. Easy to break

_____c. Producing a chip by using a chisel

13. Tang:

_____a. An angled surface

_____b. The pointed end of a file

_____c. The enlarged area on the end of a chisel, caused by striking it with a hammer

14. Chipping:

_____a. The cutting action of a tool

_____b. Easy to break

_____c. Producing a chip by using a chisel

15. Mushroom:

_____a. Easy to break

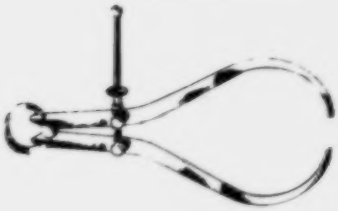
_____b. The enlarged area on the end of a chisel, caused by striking it with a hammer

_____c. A semi-precision steel rule with graduations

2. Label these non-cutting hand tools by writing the correct name in the blank beside the tool and identify their uses by matching the number from the choices below with the appropriate tool.

A._____

USE: _____



B. _____

USE: _____

C._____

USE: _____

1. Used to hold parts for sawing, filing, or other hand operations

2. Used to hold one part to another by pressure of a screw and anvil

3. Used when holding two precision parts together with two parallel jaws

4. Used for placing or removing small items in narrow spaces and when twisting and bending wires during electrical repairs

5. Used to measure lengths and to set semi-precision tools like dividers

6. Used to lock on a part when turning; they have a mechanical pressure and lock system

D. _____

USE: _____

E. _____

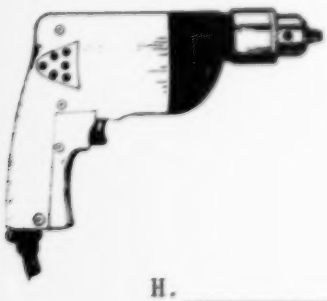
USE: _____

F. _____

USE: _____

G. _____

USE: _____



H. _____

_____

USE: _____

7. Used to loosen or tighten bolts and nuts; one size fits many

8. Used to drive a chisel or flare a pin

9. Used to cover the tang of a file

10. Used to clean a file

11. Used to tighten or loosen couplings or fittings if a wrench is not available

12. Used to tighten or loosen screws and bolts which have a head with four slots that slant downward

13. Used for layout from a reference surface; must be used with a scale

14. Used to measure outside diameters

15. Used to measure inside diameters and widths of slots

16. Used to lay out circles, arcs, measure distance between points, and transfer a measurement directly from a steel rule

17. Used to drive taps, hand reamers, and screw extractors less than 3/8 inch

18. Used to drive taps, hand reamers, and screw extractors 3/8 inch and larger

19. Used when cleaning up the bench or counter; has long fine bristles that will clean fine chips from work area

20. Used to tighten or loosen socket head screws

21. Used to tighten or loosen small machine head screws and nuts with a hexagonal head; the socket on the end is made to fit a particular size

I. _____

USE: _____

J. _____

USE: _____

K. _____

USE: _____

L. _____

USE: _____

M. _____

USE: _____

23. Used to mark the location of a hole prior to drilling by making a dent in the surface of the material

24. Used to tighten or loosen square and hexagon head bolts of a particular size; prevents slip-page

25. Used to drill or ream holes and is semi-portable

26. Used to tighten or loosen bolts and nuts with hexagonal heads, usually in places where space is limited; often equipped with a ratcheted wrench or wrench handle

27. Used to tighten or loosen nuts that have holes instead of flats that fit the pin

28. Used to tighten or loosen a screw that has a slotted head

29. Used to measure long dimensions or contoured surfaces to 1/32" accuracy

30. Used to lay out or measure angles to an accuracy of one degree

31. Used to remove bolts and screws whose heads have been broken off or damaged

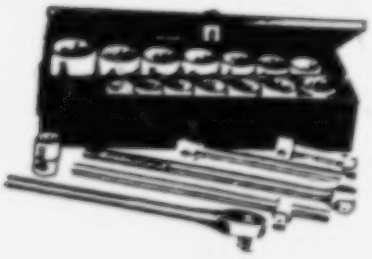
32. Used for removing objects by tapping; made of rubber, plastic, or rawhide so it does not damage the part or attachment being struck

33. Used to lay out straight and angular dimensions, measure and check angles, check for squareness, and locate centers of round parts

34. Used to hold round threading dies when cutting threads by hand

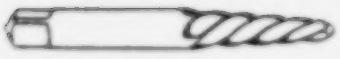
N._____

USE: _____



O._____

USE: _____

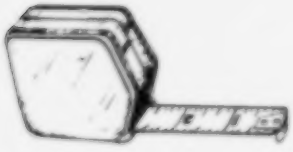


P._____

USE: _____

Q._____

USE: _____



R._____

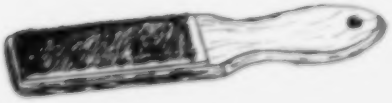
USE: _____

S._____

USE: _____

T._____

USE: _____

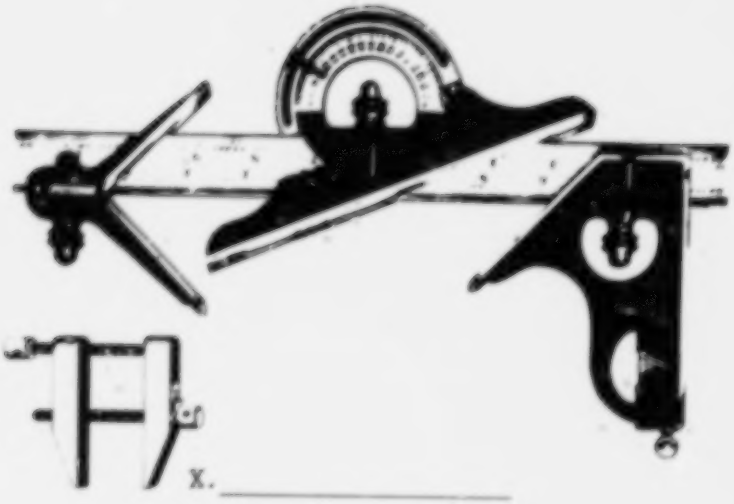


U._____

USE: _____

V._____

USE: _____



W. _____

USE: _____

X. _____

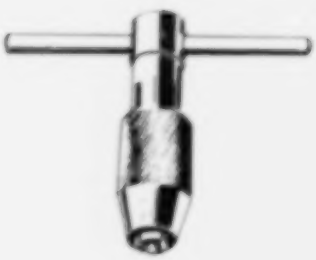
USE: _____

Y. _____

USE: _____

Z. _____

USE: _____



AA. _____

USE: _____

BB. _____

USE: _____

CC. _____

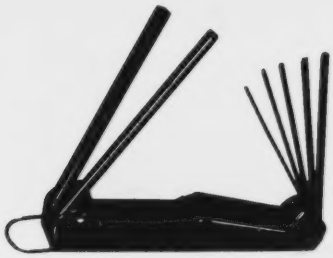
USE: _____

DD. _____

USE: _____

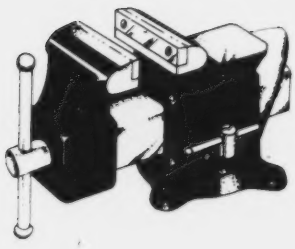
EE._____

USE: ____



FF._____

USE: _____



GG._____

USE: _____

HH._____

USE: _____

3. Label these cutting hand tools by writing the correct name in the blank beside the tool and identify their use by matching the number from the choices below with the appropriate tool.

1. Used to cut soft wire or steel bands

2. Used to cut thin sheet metal, shim stock, or band saw blade material to size or shape

A._____

USE: _____

B._____

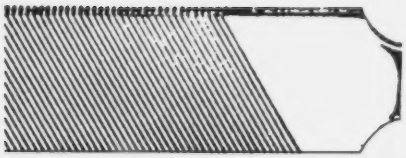
USE: _____

C._____

USE: _____

D._____

USE: _____



E._____

USE: _____

F._____

USE: _____

G._____

USE: _____

3. Used to saw metal parts to size or shape by hand

4. Used to produce internal threads in a hole that has been drilled to a specific size

5. Used to produce external threads on stock of a particular size by hand; mounted in a die stock which holds and turns it

6. Used when it is necessary to produce a hole that is accurate and smooth; designed to remove only .002" to .005" of material

7. Used for chipping flat surfaces and for cutting thin sheet metal

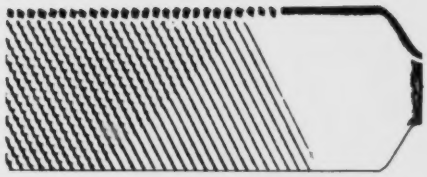
8. Used to remove burrs from holes, slots, grooves, or edges of machined parts by hand

9. A type of file used for drawfiling, lathe work, and general purpose filing where a smooth finish is required.

10. A type of file used whenever material must be removed rapidly

H. _____

USE: _____



I. _____

USE: _____

J. _____

USE: _____

4. State rules for care of hand tools by completing the following statements.

   a. Always use a tool to do work for which it is _____.

   b. Wipe _____ and _____ from tools before storing.

   c. Always _____ tools in proper place.

   d. Protect tools from _____; oil after using.

   e. Inspect tools to make sure that they are in good _____ _____.

5. Describe reasons for tap failure by completing the following statements.

   a. A hole that has been drilled too _____ requires more pressure than the tap can stand.

   b. A tap that is not _____ with the hole will bind.

   c. A _____ tap requires excessive pressure.

   d. Not using _____ _____ when required will cause the tap to bind.

   e. Failure to back up and break the _____ puts too much pressure on the tap.

   f. Failure to reverse directions of the tap once the point has reached the bottom of the hole will leave _____ _____.

   g. Using a too-large tap wrench will not allow you to feel how much _____ you are applying.

6. Stop. Have your instructor evaluate your Assignment Sheet and mark the areas below which require additional study.

   Refer to Information Sheet, Sections:

   I_____ V_____

   II_____ VI_____

   III_____

   If none of the above study areas are checked, proceed to LAP Step 6. Otherwise, study the required sections of the Information Sheet and then go to LAP Step 5.

HAND TOOLS
UNIT I

LAP ASSIGNMENT #2--HAND TOOLS

NAME_____ SCORE_____

1. Match these terms associated with hand tools to the correct definitions by selecting the definition which best identifies the term.

   1. Chipping:

      _____a. Process of making metal resistant to wear

      _____b. The cutting action of a tool

      _____c. Producing a chip by using a chisel

   2. Mushroom:

      _____a. An angled surface

      _____b. The enlarged area on the end of a chisel, caused by striking it with a hammer

      _____c. A semi-precision steel rule with graduations

   3. Tang:

      _____a. The pointed end of a file

      _____b. The sharp edge left on a metal part from a machining operation

      _____c. A thin, colored lacquer that is painted or sprayed on the surface of a part so layout lines can be seen clearly

   4. Shearing:

      _____a. Producing a chip by using a chisel

      _____b. Process of making metal resistant to wear

      _____c. The cutting action of a tool

   5. Drawfiling:

      _____a. Producing a chip by using a chisel

      _____b. The cutting action of a tool

      _____c. Pushing and pulling a file sideways along the work

6. Burr:

_____a. A sharp edge left on a metal part from a machining operation

_____b. The pointed end of a file

_____c. Tool used to produce internal threads

7. Personal injury:

_____a. Easy to break

_____b. Harm to an individual

_____c. The cutting action of a tool

8. Bottle:

_____a. Easy to break

_____b. An angled surface

_____c. The size a hole is drilled for a specific size tap

9. Tap:

_____a. Tool used to produce external threads

_____b. The size a hole is drilled for a specific size tap

_____c. A cutting tool used to cut internal threads

10. Tap drill size:

_____a. The cutting action of a tool

_____b. The size a hole is drilled for a specific size tap

_____c. A semi-precision steel rule with graduations

11. Reference surface:

_____a. An angled surface

_____b. The sharp edge left on a metal part from a machining operation

_____c. The side from which dimensions are taken or made

12. Threading die:

_____a. Tool used to produce external threads

_____b. Harm to an individual

_____c. Producing a chip by using a chisel

13. Scale:

_____a. The pointed end of a file

_____b. The shape edge left on a metal part from a machining operation

_____c. Producing a chip by using a chisel

13. Scale:

_____a. The pointed end of a file

_____b. The sharp edge left on a metal part from a machining operation

_____c. A semi-precision rule with graduations

14. Layout solution:

_____a. Process of making metal resistant to wear

_____b. A thin, colored lacquer that is painted or sprayed on the surface of a part so layout lines can be seen clearly

_____c. A semi-precision rule with graduations

15. Chamfer:

_____a. An angled surface

_____b. The enlarged area on the end of a chisel, caused by striking it with a hammer

_____c. The cutting action of a tool

2. Label these non-cutting hand tools by writing the correct name and use in the space provided.

A.

_____

Use -- _____

_____

_____

B.

_____

Use -- _____

_____

_____

C.

_____

Use -- _____

_____

_____

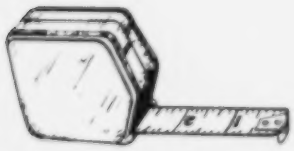
D.

_____

Use -- _____

_____

_____

E. 

_____

Use -- _____

_____

_____

F.

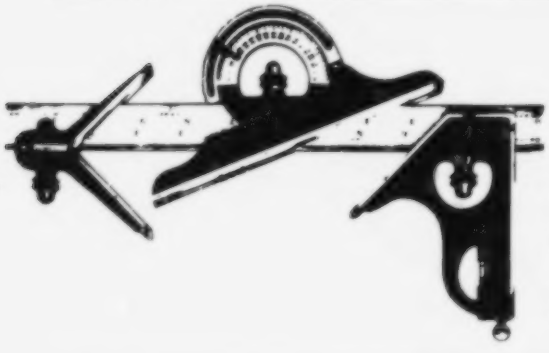
Use -- _____

G.

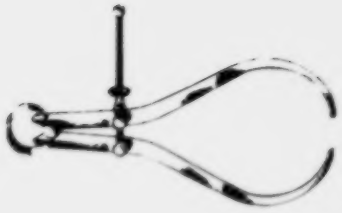
Use -- _____

H.

Use -- _____

I. 

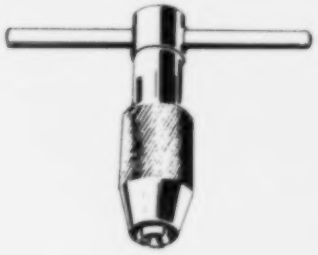
Use -- _____

J. 

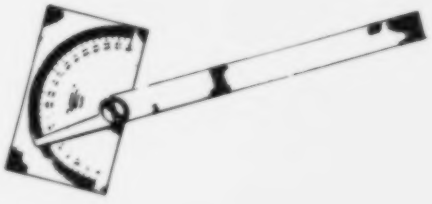
Use -- _____

K.

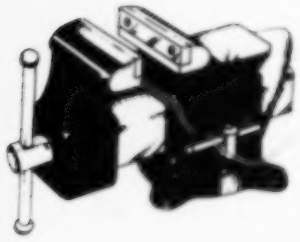
Use -- _____

L. 

Use -- _____

M. 

Use -- _____

N. 

_____

Use -- _____

_____

_____

O.

_____

Use -- _____

_____

_____

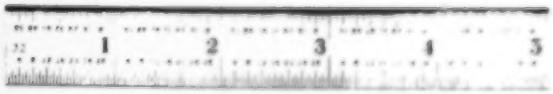
P.

_____

Use -- _____

_____

_____

Q. 

_____

Use -- _____

_____

_____

R.

_____

Use -- _____

_____

_____

S.

_____

Use -- _____

_____

_____

T.

_____

Use -- _____

_____

_____

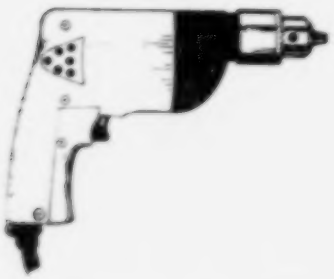
U.

_____

Use -- _____

_____

_____

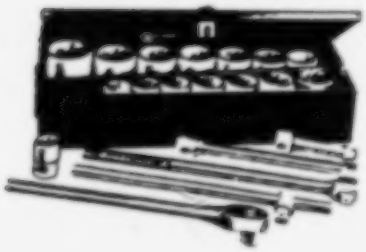
V. 

_____

Use -- _____

_____

_____

W. 

_____

Use -- _____

_____

_____

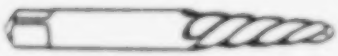
X.

_____

Use -- _____

_____

_____

Y. 

_____

Use -- _____

_____

_____

Z.

_____

Use -- _____

_____

_____

AA.

_____

Use -- _____

_____

_____

BB.

_____

Use -- _____

_____

_____

CC.

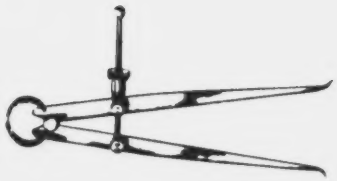
_____

Use -- _____

_____

_____

DD.



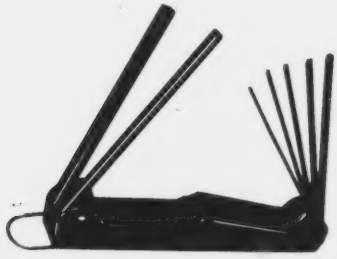
_____

Use -- _____

_____

_____

EE.



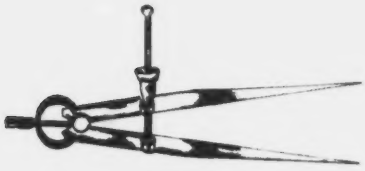
_____

Use -- _____

_____

_____

FF.



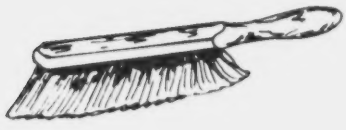
_____

Use -- _____

_____

_____

GG.



_____

Use -- _____

_____

_____

HH.

_____

Use -- _____

_____

_____

3. Label cutting hand tools with their appropriate name and use. Write the correct names and descriptions in the blanks.

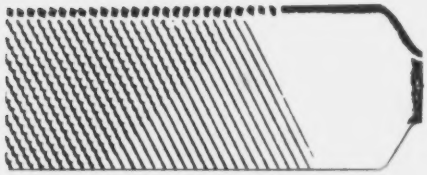
a.

_____

Use -- _____

_____

_____

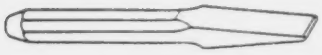
b. 

_____

Use -- _____

_____

_____

c. 

_____

Use -- _____

_____

_____

d.

_____

Use -- _____

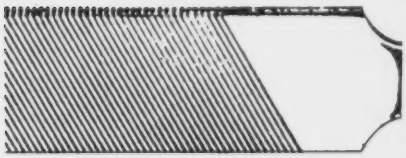
_____

e.

_____

Use -- _____

_____

f. 

_____

Use -- _____

_____

g.

_____

Use -- _____

_____

h.

_____

Use -- _____

_____

_____

i.

_____

Use -- _____

_____

_____

j.

_____

Use -- _____

_____

_____

4. State the rules for the care of hand tools by completing the following statements.

   a. Always use a tool to do the work _____ _____ _____ _____ _____.

   b. Wipe chips and _____ from tools _____ _____.

   c. Always store tools in the _____ _____.

   d. Protect tools from rust; _____ _____ _____

   e. Inspect tools to make sure they are _____ _____ _____ _____.

   f. Never use a _____ _____ on _____ to get more leverage.

5. Describe reasons for tap failure by explaining how each of the following conditions can cause damage.

   a. Hole drilled too small: _____

   _____

   _____

   b. Tap not straight with hole: _____

   _____

   c. A dull tap: _____

   _____

   d. No cutting fluid: _____

   _____

   e. Failure to break chips: _____

   _____

   f. Failure to reverse direction once the tap has reached the bottom of the hole: _____

   _____

   g. Using a tap wrench which is too large: _____

   _____

6. Stop. Have your instructor evaluate your Assignment Sheet. If your instructor is satisfied with your progress, continue to LAP Step 7. If additional study is required, discuss a program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to LAP Step 7.

HAND TOOLS
UNIT I

LAP ASSIGNMENT SHEET #3--COMPLETE HAND TOOL SAFETY TEST

NAME_____ SCORE_____

DIRECTIONS: Complete the following statements.

1. When using a machinist's bench:

   a. Always clamp work well in the _____.

   b. Do not use a _____ _____ or _____ to tighten the vise, and

   c. Never hammer on the _____ _____.

2. It is better to use a wrench of the correct size than to use an adjustable wrench because adjustable wrenches can _____, causing _____ to the bolt or nut or _____ to the user.

3. It is safer to push/pull a wrench. (Cross out the incorrect choice)

4. Never strike two hard objects like hammers together because a piece may _____ _____, possibly causing injury to anyone in the area.

5. Pliers should never be used on nuts or bolts since they may _____, causing damage to the nut or bolt and possibly injuring the user.

6. File handles are used on the tangs of files to prevent a _____ wound to the user.

7. Using the incorrect size of screwdriver can damage the _____ of the screw or chip the _____ of the screwdriver.

8. Hardened steel files should never be used as pry bars because they will _____ very easily.

9. Misuse of the screwdriver, such as using it as a chisel or striking it with a _____ _____, can damage the tool.

10. Since the screwdriver may slip and cause a stab wound, it is safer to lay the work on a bench or hold it in a _____ rather than to hold it in your hand.

11. Always _____ sharp and pointed tools in a place where you will not stab yourself with them.

12. Never use a hammer that has a _____ handle or _____ head because the head may fly off and injure someone.

13. _____ off the mushroomed heads on chisels to make them safer to use.

14. When chipping with a chisel, you should always/sometimes/never chip away from yourself and others. (Circle the correct answer)

15. It is safer to use a brush/air hose to remove chips from a work. (Crossout the incorrect answer)

16. When using the hacksaw, always hold the part in the vise _____ to the jaw and ease up on the pressure when you are about to cut through so that your hands will not _____ the vise or work.

17. To keep tools in good working condition and to avoid injuring someone with a damaged tool, you should report all/most/no accidents or tool damage. (Circle the correct answer)

18. Stop. Have your instructor evaluate your Assignment Sheet. If you score 100 percent, continue to LAP Step 11. If additional study is required, discuss a program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to LAP Step 11.

HAND TOOLS
UNIT I

LAP ASSIGNMENT SHEET #4--DETERMINE TAP DRILL SIZE

NAME_____ SCORE_____

DIRECTIONS: Use the charts provided to answer the following questions on tap drill size.

1. Fill in the drill size and decimal equivalents for each of the taps listed.

MACHINE SCREW SIZES UNC and UNF				
NOMINAL SIZE TAP	RECOMMENDED TAP DRILL		PROBABLE HOLE SIZE	% THREAD
	DRILL	DEC.		
0-80	3/64	.0469	.0484	71
1-64	53	.0595	.0610	59
1-72	53	.0595	.0610	67
2-56	50	.0700	.0717	62
2-64	50	.0700	.0717	70
3-48	47	.0785	.0804	69
3-56	46	.0810	.0829	69
4-40	43	.0890	.0910	65
4-48	42	.0935	.0955	61
5-40	38	.1015	.1038	65
5-44	37	.1040	.1063	63
6-32	36	.1065	.1091	71
6-40	33	.1130	.1156	69
8-32	29	.1360	.1389	62
8-36	29	.1360	.1389	70
10-24	26	.1470	.1502	74
10-32	21	.1590	.1622	68
12-24	16	.1770	.1805	66
12-28	15	.1800	.1835	70

FRACTIONAL SIZES UNC and UNF				
NOMINAL SIZE TAP	RECOMMENDED TAP DRILL		PROBABLE HOLE SIZE	% THREAD
	DRILL	DEC.		
1/4-20	7	.2010	.2048	70
1/4-28	3	.2130	.2168	72
5/16-18	F	.2570	.2608	72
5/16-24	I	.2720	.2761	67
3/8-16	5/16	.3125	.3169	72
3/8-24	Q	.3320	.3364	71
7/16-14	U	.3680	.3726	70
7/16-20	25/64	.3906	.3952	65
1/2-13	27/64	.4219	.4266	73
1/2-20	29/64	.4531	.4578	65
9/16-12	31/64	.4844	.4892	68
9/16-18	33/64	.5156	.5204	58
5/8-11	17/32	.5312	.5361	75
5/8-18	37/64	.5781	.5831	58
3/4-10	21/32	.6562	.6612	68
3/4-16	11/16	.6875	.6925	71
7/8-9	49/64	.7656	.7708	72
7/8-14	13/16	.8125	.8177	62
1-8	7/8	.8750	.8809	73
1-12	59/64	.9219	.9279	67

		Drill Size	Decimal Equivalent
a.	1/4 - 20 NC		
b.	3/8 - 24 NF		
c.	1/2 - 13NC		
d.	3/4 - 10 NC		
e.	7/8 - 14 NF		
f.	#8 - 32 NC		
g.	#12 - 28 NF		

2. The formula for tap drill size (T.D.S.) is:

$$\text{T.D.S} = \text{Nominal size of tap} - \frac{(.01299 \times \text{percent of thread desired})}{\text{Number of threads}}$$

Use this formula to calculate the tap drill size for the following taps with a 70 percent thread. Leave your answers in decimal form and show all your work in the square provided.

a. 9/16 - 18 NF = _____ size of tap drill

b. 1/4 - 20 NC = _____ size of tap drill

c. 1/2 - 13 NC = _____ size of tap drill

3. The standard T.D.S. formula can be expressed as:

T.D.S. = Nominal size of tap -

where N is the number of threads

Use this formula to calculate the tap drill size for the following taps. Show all your work and state your answer in decimal form.

a. 5/16 - 24 NC = _____ tap drill size

b. 1 - 8 NC = _____ tap drill size

4. Stop. Have your instructor evaluate your Assignment Sheet. If your instructor is satisfied with your progress, continue to LAP Step 15. If additional study is required, discuss a program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to LAP Step 15.

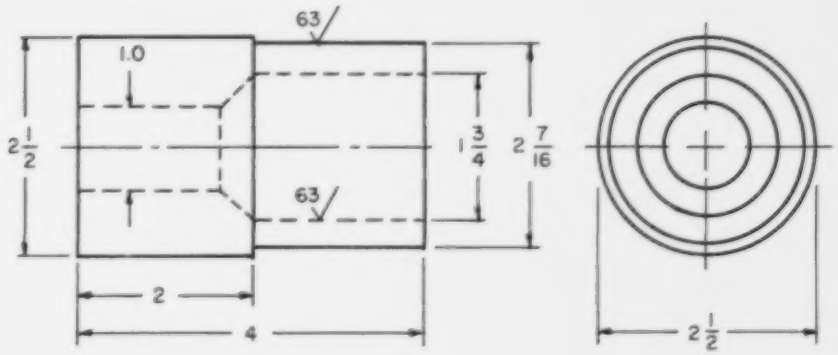
HAND TOOLS
UNIT I

LAP ASSIGNMENT SHEET #5--PLAN PROCEDURES FOR COMPLETING SHOP PROJECTS

NAME_____ SCORE_____

DIRECTIONS: Describe the procedures, list the tools and materials needed, and estimate the time required to produce the parts shown on the blueprints below.

1.



A. List the step-by-step procedure you would use to make this part.

_____

_____

_____

_____

_____

_____

_____

_____

B. List the tools required to complete this job.

1. _____ 5. _____

2. _____ 6. _____

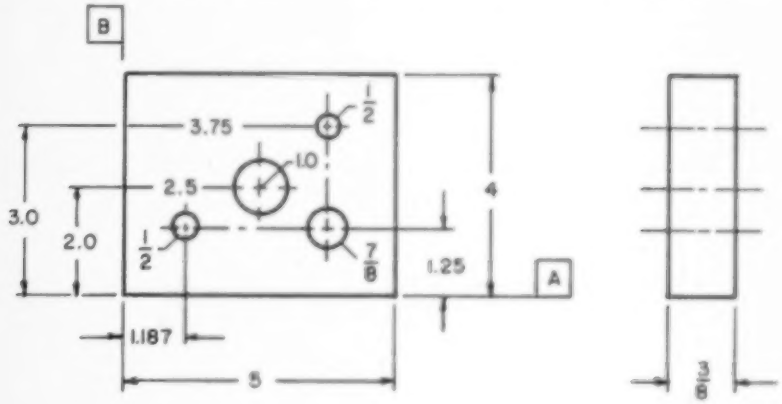
3. _____ 7. _____

4. _____ 8. _____

C. Estimate how long it will take to complete this part.

_____

2.



A. List the step-by-step procedure you would use to make this part.

_____

_____

_____

_____

_____

_____

_____

_____

B. List the tools required to complete this job.

1. _____ 5. _____

2. _____ 6. _____

3. _____ 7. _____

4. _____ 8. _____

C. Estimate how long it will take to complete this part.

3. Stop. Have your instructor evaluate your Assignment Sheet. If your instructor is satisfied with your progress, continue to LAP Step 68. If additional study is required, discuss a program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to LAP Step 68.

State Department of Vocational and Technical Education CIMC. Stillwater, Oklahoma LEARNING ACTIVITY PACKETS

for MACHINE SHOP I

LAP NO. _____ CODE: _____

MAJOR INSTRUCTIONAL AREA

HAND AND BENCH WORK

INSTRUCTIONAL UNIT

PEDESTAL GRINDER
SECTION C--UNIT II

LEARNING ACTIVITY PACKET NO.

12

PREREQUISITE LAP(S)

1, 2, 3, 4, 5

PURPOSE: This Learning Activity Packet (LAP) outlines the study activities and performance tasks for "Pedestal Grinder." Accomplishing these procedures will aid the student in attaining a working knowledge of this area of training and in achieving a SKILLED or MODERATELY SKILLED competency level in the performance of jobs associated with this specialty.

INTRODUCTION: The course of study in this LAP will help the student become able to use the pedestal grinder safely, to identify the different types of grinding wheels, and to perform the maintenance required for the pedestal grinder.

TASKS INCLUDED IN THIS LAP:

1. Check new grinding wheel for cracks
2. Replace grinding wheel
3. Dress grinding wheel
4. Grind high-speed steel tool bit
5. Grind drill bit

MACHINE SHOP I
PEDESTAL GRINDER
SECTION C--UNIT II

LEARNING STEPS

Check the Following
Blanks as You Complete
the Required Steps.

_____1. Read Unit and Specific Objectives, page 89-C.

_____2. Complete Pedestal Grinder Pre-Test, LAP page 7.

_____3. Study The sections of the Information Sheet, pages 93-C through 103-C, indicated by your instructor on your Pre-Test. Be sure to refer to the Transparency Masters when required.

_____4. Refer To Step 8 of your Pre-Test. If additional study is indicated for any of Sections I, III, V, VI, or VII, continue to Step 5. Otherwise, proceed to Step 7.

_____5. Do LAP Assignment Sheet #1, LAP page 13.

_____6. Do LAP Assignment Sheet, #2, LAP page 21.

_____7. Refer To Step 8 of your Pre-Test. If additional study is indicated for Section II, continue to Step 8. Otherwise, proceed to Step 11.

_____8. Do Assignment Sheet #1--Complete Pedestal Grinder Safety Test, page 105-C.

_____9. Stop. Have your instructor evaluate Assignment Sheet #1. If you score 100 percent, proceed to Step 11. Otherwise, continue to Step 10.

_____10. Do LAP Assignment Sheet #3, LAP page 25.

_____11. Refer To Step 8 of your Pre-Test. If additional study is required for Section IV, continue to Step 12. Otherwise, proceed to Step 13.

_____12. Do Assignment Sheet #2--Interpret Composition of Grinding Wheels, page 109-C.

_____13. Stop. Have your instructor evaluate Assignment Sheet #2. If your instructor is satisfied with your performance, proceed to Step 15. Otherwise, continue to Step 14.

_____14. Do LAP Assignment Sheet #4, LAP page 27.

_____15. Check The tasks below which you feel that you can perform without supervision.

Student Check		Instructor Initials/Date	
		Skilled	Moderately Skilled
_____a.	Check new grinding wheel for cracks (18)	_____	_____
_____b.	Replace grinding wheel (24)	_____	_____
_____c.	Dress grinding wheel (30)	_____	_____
_____d.	Grind high-speed steel tool bit (36)	_____	_____
_____e.	Grind drill bit (42)	_____	_____

_____16. Discuss Your competency in each task with your instructor. Your instructor will initial each task in which you demonstrate sufficient competency. If all tasks have been initialed, proceed to Step 49. Otherwise, continue to Step 17.

_____17. Refer To Step 15a. If this task has been initialed, proceed to Step 23. Otherwise, continue to Step 18.

_____18. Study Job Sheet #1--Check New Grinding Wheel for Cracks, page 113-C.

_____19. Watch Slide/tape presentation "Check New Grinding Wheel for Cracks" (C-II-1).

_____20. Do Job Sheet #1--Check New Grinding Wheel for Cracks.

_____21. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, have your instructor initial Step 15a and proceed to Step 23. Otherwise, repeat Steps 18-20 and then go to Step 22.

_____22. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, have your instructor initial Step 15a and continue to Step 23. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, have your instructor initial Step 15a and continue to Step 23.

_____23. Refer To Step 15b. If this task has been initialed, proceed to Step 29. Otherwise, continue to Step 24.

_____24. Study Job Sheet #2--Replace Grinding Wheel, page 115-C.

_____25. Watch Slide/tape presentation "Replace Grinding Wheel" (C-II-2).

_____26. Do Job Sheet #2--Replace Grinding Wheel.

_____27. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, have your instructor initial Step 15b and proceed to Step 29. Otherwise, repeat Steps 24-26 and then go to Step 28.

_____28. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, have your instructor initial Step 15b and continue to Step 29. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, have your instructor initial Step 15b and continue to Step 29.

_____29. Refer To Step 15c. If this task has been initialed, proceed to Step 35. Otherwise, continue to Step 30.

_____30. Study Job Sheet #3--Dress Grinding Wheel, page 117-C.

_____31. Watch Slide/tape presentation "Dress Grinding Wheel" (C-II-3).

_____32. Do Job Sheet #3--Dress Grinding Wheel.

_____33. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, have your instructor initial Step 15c and proceed to Step 35. Otherwise, repeat Steps 30-32 and then go to Step 34.

_____34. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, have your instructor initial Step 15c and continue to Step 35. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, have your instructor initial Step 15c and continue to Step 35.

_____35. Refer To Step 15d. If this task has been initialed, proceed to Step 41. Otherwise, continue to Step 36.

_____36. Study Job Sheet #4--Grind High-Speed Steel Tool Bit, page 119-C.

_____37. Watch Slide/tape presentation "Grind High-Speed Steel Tool Bit" (C-II-4).

_____38. Do Job Sheet #4--Grind High-Speed Steel Tool Bit.

_____39. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, have your instructor initial Step 15d and proceed to Step 41. Otherwise, repeat Steps 36-38 and then go to Step 40.

_____40. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, have your instructor initial Step 15d and continue to Step 41. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, have your instructor initial Step 15d and continue to Step 41.

_____41. Refer To Step 15e. If this task has been initialed, proceed to Step 47. Otherwise, continue to Step 42.

_____42. Study Job Sheet #5--Grind Drill Bit, page 125-C.

_____43. Watch Slide/tape presentation "Grind Drill Bit" (C-II-5).

_____44. Do Job Sheet #5--Grind Drill Bit.

_____45. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, have your instructor initial Step 15e and proceed to Step 47. Otherwise, repeat Steps 42-44 and then go to Step 46.

_____46. Stop. Have your instructor evaluate your work. If you achieve a SKILLED or MODERATELY SKILLED rating, have your instructor initial Step 15e and continue to Step 47. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, have your instructor initial Step 15e and continue to Step 47.

_____47. Refer To Step 15. If all tasks have been initialed, continue to Step 48. Otherwise refer to the step indicated in parentheses after the unsigned task.

_____48. Review Information Sheet (page 93-C) and Assignment Sheets 1 and 2.

_____49. Take Pedestal Grinder Unit II Test (see your instructor). If your score is 85 percent or above, continue to the next Learning Activity Packet. If you do not score 85 percent or above, ask your instructor about additional study requirements and possible re-testing.

PEDESTAL GRINDER
UNIT II

PRE-TEST

NAME_____ SCORE_____

DIRECTIONS: This test is to determine how much you already know about the pedestal grinder. Your performance on this test will not be used to determine your grade in the course. Instead, it will guide your instructor in designing this course to meet your needs. Answer only those questions for which you know the answer. Guessing may prevent you from receiving the lessons which are required.

1. Match the terms on the right associated with the pedestal grinder and hand grinding to their definitions by writing the number of the term in the blank beside the correct definition. Definitions continue on next page.

_____a.	The outside circumference of a grinding wheel	1. Honing
_____b.	Tool is too hot and will lose its temper	2. Trueing
_____c.	Condition of grinding wheel face where sharp cutting surface has been worn smooth	3. Face of grinding wheel
_____d.	Checking grinding wheel for cracks	4. Abrasive
_____e.	Making new, sharp cutting agents on the face of the wheel by removing worn surface	5. Arbor
_____f.	The cutting agent of a grinding wheel	6. Grade
_____g.	Pores of the grinding wheel have become filled with particles of material being ground	7. Loaded
_____h.	Making wheel circumference true to its center	8. Structure
_____i.	Size of the abrasive	9. Grain
_____j.	The strength of the bonding agent holding the wheel together; allows the wheel to wear	10. Dressing
_____k.	Type of material used to hold the wheel together	11. Bond
_____l.	Number describing the spacing of the abrasive	12. Burn
_____m.	A shaft or spindle used to hold a revolving cutting tool or work to be cut	13. Ringing
		14. Glazing

_____n. Removing the wire edge with a fine abrasive stone after a tool has been ground

2. State rules that apply to the safe use of the pedestal grinder by explaining how each of the following terms applies to the safe use of the grinder.

a. Starting -- _____

_____

b. Tool rest and spark breaker -- _____

_____

c. Eyes -- _____

_____

d. Pressure -- _____

_____

e. Non-ferrous materials -- _____

_____

f. Adjustments -- _____

_____

g. Gloves -- _____

_____

h. Respirator -- _____

_____

i. Excessive vibration -- _____

_____

j. Face of grinding wheel -- _____

_____

k. Side of wheel -- _____

_____

l. Glazing -- _____

_____

m. Glazed or loaded wheel -- _____

_____

n. Electrical switches -- _____

_____

o. Heat -- _____

_____

p. Guards -- _____

_____

q. Horseplay -- _____

_____

3. Select the proper grinding wheel for the materials listed by choosing the required wheel from the following list and writing the number of that wheel in the blank provided beside the material.

1. Coarse silicon carbide
2. Medium silicon carbide
3. Fine silicon carbide
4. Coarse aluminum oxide
5. Fine aluminum oxide

_____a. To rough grind a high-speed steel lathe tool

_____b. To rough grind a cast iron part

_____c. To finish grind a part made of hardened tool steel

_____d. To finish grind a high-speed steel lathe tool

_____e. To sharpen a tool made of high-speed steel

_____f. To rough grind a carbide tool bit

_____g. To finish grind a part made of cast iron

_____h. To sharpen a carbide tool

4. Using the grinding wheel chart below, interpret the composition of the following grinding wheels.

ABRASIVE	GRIT SIZE		GRADE	STRUCTURE	BOND TYPE	NORTON SYMBOL
Alundum = A	Coarse	Medium	Soft	The structure number of a wheel refers to the relative spacing of the grains of abrasive the larger the number the wider the grain spacing	V = Vitrified B = Resinoid R = Rubber E = Shellac	Letter or numeral or both to designate a variation or modification of bond or other characteristic of the wheel Typical symbols are P G BE
16 Alundum = 16A	10	30	A			
19 Alundum = 19A	12	36	Thru			
23 Alundum = 23A	14		H			
32 Alundum = 32A	16	46				
38 Alundum = 38A	20	54	Medium			
53 Alundum = 53A	24	60	I			
57 Alundum = 57A			Thru			
75 Alundum = 75A		very	P			
NZ Alundum = NZ	Fine	Fine				
ZF Alundum = ZF	70	220	Hard			
ZS Alundum = ZS	80	240	Q			
37 Crystolon = 37C	90	280	Thru			
39 Crystolon = 39C	100	320	Z			
CBN = CB	120	400				
	150	500				
	180	600				

Used with permission of Norton Company.

a. 32A36-H8VBE

Abrasive -- _____
Grain size -- _____
Structure -- _____
Bond -- _____

b. 37C20-H8VK

Abrasive -- _____
Grain size -- _____
Structure -- _____
Bond -- _____

5. Describe the care and storage of grinding wheels in the spaces below.

a. Dressing -- _____

_____

_____

b. Storing thin wheels -- _____

_____

_____

c. Speed -- _____

_____

_____

d. Paper washers or blotters -- _____

_____

_____

e. Starting large wheels -- _____

_____

_____

f. Trueing -- _____

_____

_____

g. Tightening -- _____

_____

_____

h. Balancing large wheels -- _____

_____

_____

i. Ringing -- _____

_____

_____

6. Match these three grinding problems to their possible causes and corrections by writing the number of the problem in the space beside the cause of that problem. Some of the causes may produce more than one problem, so you may have more than one answer per blank.

1. Burning of workpiece
2. Wheel slows or stalls
3. Wheel corner breakdown

_____a. Cause -- Wheel too hard
Correction -- Use softer grade and/or coarser grit wheel

_____b. Cause -- Not enough pressure
Correction -- Increase amount of pressure or reduce contact area

_____c. Cause -- Wheel too soft
Correction -- Use harder grade of wheel

_____d. Cause -- Pressure too high
Correction -- Reduce pressure or reduce contact area

_____e. Cause -- Wheel too coarse
Correction -- Use finer grit wheel

_____f. Cause -- Wheel face loaded
Correction -- Dress to open wheel face

_____g. Cause -- Belt slippage
Correction -- Adjust and retighten belts

_____h. Cause -- Worn spindle
Correction -- Check spindle run out and correct

7. Name five jobs that are pedestal grinder operations.

a. _____

b. _____

c. _____

d. _____

e. _____

8. Stop. Have your instructor evaluate your Pre-Test and mark the areas below which require additional study.

Refer to Information Sheet, Section(s):

I_____ V_____

II_____ VI_____

III_____ VII_____

IV_____

If any of the above study areas is checked, continue to LAP Step 3. Otherwise, proceed to LAP Step 15.

HAND AND BENCH WORK
UNIT II

LAP ASSIGNMENT SHEET #1--PEDESTAL GRINDERS

NAME_____ SCORE_____

1. Match these terms associated with the pedestal grinder to their definitions by selecting the correct definition from the choices provided.

   1. Dressing:

      _____a. Checking grinding wheel for cracks

      _____b. Making new, sharp cutting agents on the face of the wheel by removing worn surface

      _____c. Making wheel circumference true to its center

   2. Bond:

      _____a. The outside circumference of a grinding wheel

      _____b. The strength of the bonding agent holding the wheel together; allows the wheel to wear

      _____c. Type of material used to hold the wheel together

   3. Arbor:

      _____a. The cutting agent of a grinding wheel

      _____b. Size of the abrasive

      _____c. A shaft or spindle used to hold a revolving cutting tool or work to be cut

   4. Burn:

      _____a. Tool is too hot and will lose its temper

      _____b. Condition of grinding wheel face where sharp cutting surface has been worn smooth

      _____c. Removing the wire edge with a fine abrasive stone after a tool has been ground

5. Grain:

_____a. Number describing the spacing of the abrasive

_____b. The cutting agent of a grinding wheel

_____c. Size of the abrasive

6. Abrasive:

_____a. The outside circumference of a grinding wheel

_____b. The cutting agent of a grinding wheel

_____c. Type of material used to hold the wheel together

7. Face of grinding wheel:

_____a. The outside circumference of a grinding wheel

_____b. Making new sharp cutting agents on the face of the wheel by removing worn surface

_____c. Type of material used to hold the wheel together

8. Honing:

_____a. Checking grinding wheel for cracks

_____b. Making wheel circumference true to its center

_____c. Removing the wire edge with a fine abrasive stone after a tool has been ground

9. Trueing:

_____a. Checking grinding wheel for cracks

_____b. Making wheel circumference true to its center

_____c. Type of material used to hold the wheel together

10. Glazing:

_____a. Condition of grinding wheel face where sharp cutting surface has been worn smooth

_____b. Pores of the grinding wheel have become filled with particles of material being ground

_____c. Type of material used to hold the wheel together

11. Ringing:

_____a. Checking the grinding wheel for cracks

_____b. Making wheel circumference true to its center

_____c. Removing the wire edge with a fine abrasive stone after a tool has been ground

12. Loaded:

_____a. Condition of grinding wheel face where sharp cutting surface has been worn smooth

_____b. Pores of the grinding wheel have become filled with particles of material being ground

_____c. The strength of the bonding agent holding the wheel together; allows the wheel to wear

13. Structure:

_____a. The outside circumference of a grinding wheel

_____b. The strength of the bonding agent holding the wheel together; allows the wheel to wear

_____c. Number describing the spacing of the abrasive

14. Grade:

_____a. Size of the abrasive

_____b. The strength of the bonding agent holding the wheel together; allows the wheel to wear

_____c. Number describing the spacing of the abrasive

2. Select the proper grinding wheel for different materials by choosing the correct grinding wheel from the choices provided for each job.

1. Sharpen a carbide tool:

_____a. Fine aluminum oxide

_____b. Fine silicon carbide

_____c. Medium silicon carbide

2. Finish grind a part made of cast iron:

_____a. Fine aluminum oxide

_____b. Fine silicon carbide

_____c. Medium silicon carbide

3. Rough grind a carbide tool bit:

   _____a. Coarse aluminum oxide

   _____b. Coarse silicon carbide

   _____c. Medium silicon carbide

4. Sharpen a high-speed steel tool:

   _____a. Coarse aluminum oxide

   _____b. Fine aluminum oxide

   _____c. Fine silicon carbide

5. Finish grind a high-speed steel lathe tool:

   _____a. Coarse aluminum oxide

   _____b. Fine aluminum oxide

   _____c. Fine silicon carbide

6. Finish grind a part made of hardened tool steel:

   _____a. Coarse aluminum oxide

   _____b. Fine aluminum oxide

   _____c. Fine silicon carbide

7. Rough grind a cast iron part:

   _____a. Coarse aluminum oxide

   _____b. Coarse silicon carbide

   _____c. Medium silicon carbide

8. Rough grind a high-speed steel lathe tool:

   _____a. Coarse aluminum oxide

   _____b. Coarse silicon carbide

   _____c. Fine aluminum oxide

3. Describe the care and storage of grinding wheels by completing the following statements.

   a. Dressing -- A grinding wheel is dressed to improve or alter its _____ action. Dressing removes dull abrasive _____ and any foreign matter that the wheel may have picked up and exposes sharp new _____ grains.

b. Storing thin wheels -- It is recommended that all thin wheels be stored _____ with cardboard between them and in a cool place (60° to _____°F).

c. Speed -- Never turn a grinding wheel faster than the speed marked on the _____.

d. Paper washers or blotters -- These are used to compensate for any unevenness in the _____ of the grinding wheel and must always be used.

e. Starting large wheels -- Start and stop large wheels several times to allow the wheel to gain _____ slowly.

f. Trueing -- New wheels mounted for the first time need to be trued, making the center concentric to the _____.

g. Tightening -- Never overtighten the _____ that holds the wheel because you can crack the wheel.

h. Balancing large wheels -- Wheels _____ inches or larger must be balanced on the spindle or hub before mounting.

i. Ringing -- Checking the wheel for cracks; if it has a crack it will not ring _____.

4. Match these grinding problems to their possible causes and corrections by selecting the most likely cause from the choices given.

1. Burning of workpiece:

_____a. Cause -- Wheel too hard
Correction -- Use softer grade and/or coarser grit wheel

_____b. Cause -- Wheel too soft
Correction -- Use harder grade wheel

_____c. Cause -- Pressure too high
Correction -- Reduce pressure or reduce contact area

2. Wheel slows or stalls:

_____a. Cause -- Wheel too hard
Correction -- Use softer grade and/or coarser grit wheel

_____b. Cause -- Wheel too coarse
Correction -- Use finer grit wheel

_____c. Cause -- Worn spindle
Correction -- Check spindle run out and correct

3. Wheel corner breakdown:

_____a. Cause -- Not enough pressure
Correction -- Increase amount of pressure or reduce contact area

_____b. Cause -- Wheel too soft
Correction -- Use harder grade wheel

_____c. Cause -- Wheel face loaded
Correction -- Dress to open wheel face

4. Burning of workpiece:

_____a. Cause -- Not enough pressure
Correction -- Increase amount of pressure or reduce contact area

_____b. Cause -- Pressure too high
Correction -- Reduce pressure or reduce contact area

_____c. Cause -- Belt slippage
Correction -- Adjust and retighten belts

5. Wheel slows or stalls:

_____a. Cause -- Not enough pressure
Correction -- Increase amount of pressure or reduce contact area

_____b. Cause -- Pressure too high
Correction -- Reduce pressure or reduce contact area

_____c. Cause -- Wheel face loaded
Correction -- Dress to open wheel face

6. Wheel corner breakdown:

_____a. Cause -- Wheel too hard
Correction -- Use softer grade and/or coarser grit wheel

_____b. Cause -- Wheel too coarse
Correction -- User finer grit wheel

_____c. Cause -- Belt slippage
Correction -- Adjust and retighten belts

7. Burning of workpiece:

_____a. Cause -- Wheel too soft
Correction -- Use harder grade wheel

_____b. Cause -- Pressure too hard
Correction -- Reduce pressure or reduce contact area

_____c. Cause -- Wheel face loaded
Correction -- Dress to open wheel face

8. Wheel slows or stalls:

_____a. Cause -- Wheel face loaded
Correction -- Dress to open wheel face

_____b. Cause -- Belt slippage
Correction -- Adjust and retighten belts

_____c. Cause -- Worn spindle
Correction -- Check spindle run out and correct

9. Wheel corner breakdown:

_____a. Cause -- Not enough pressure
Correction -- Increase amount of pressure or reduce contact area

_____b. Cause -- Pressure too high
Correction -- Reduce pressure or reduce contact area

_____c. Cause -- Worn spindle
Correction -- Check spindle run out and correct

5. Name jobs that are pedestal grinder operations by checking those jobs below which are grinder operations.

_____a. Finish brass fittings

_____b. Clean up welds

_____c. Sharpen copper rods

_____d. Grind steel parts to shape

_____e. Grind lathe or sharpen tool to shape

_____f. Shape dowel rods

_____g. Grind aluminum parts to shape

_____h. Sharpen drills

_____i. Deburr parts

_____j. Quickly dress wheels not mounted on the grinder

6. Stop. Have your instructor evaluate your Assignment Sheet and mark the areas below which require additional study.

Refer to Information Sheet, Section(s);

I_____ VI_____

III_____ VII_____

V_____

If any of the above areas is checked, study the required section(s) of the Information Sheet and then continue to LAP Step 6. Otherwise, proceed to LAP Step 7.

PEDESTAL GRINDER
UNIT II

LAP ASSIGNMENT #2--PEDESTAL GRINDERS

NAME_____ SCORE_____

1. Match terms associated with the pedestal grinder and hand grinding to the correct definitions. Write the correct numbers in the blanks.

_____a.	The outside circumference of a grinding wheel	1.	Grade
_____b.	Tool is too hot and will lose its temper	2.	Structure
_____c.	Condition of grinding wheel face where sharp cutting surface has been worn smooth	3.	Loaded
_____d.	Checking grinding wheel for cracks	4.	Ringing
_____e.	Making new, sharp cutting agents on the face of the wheel by removing worn surface wheel	5.	Glazing
_____f.	The cutting agent of a grinding wheel	6.	Trueing
_____g.	Pores of the grinding wheel have become filled with particles of material being ground	7.	Honing
_____h.	Making wheel circumference true to its center	8.	Face of grinding
_____i.	Size of the abrasive	9.	Abrasive
_____j.	The strength of the bonding agent holding the wheel together; allows the wheel to wear	10.	Grain
_____k.	Type of material used to hold the wheel together	11.	Burn
_____l.	Number describing the spacing of the abrasive	12.	Arbor
_____m.	A shaft or spindle used to hold a revolving cutting tool or work to be cut	13.	Bond
_____n.	Removing the wire edge with a fine abrasive stone after a tool has been ground	14.	Dressing

2. Select the proper grinding wheel for different materials. Write the correct numbers in the blanks.

_____a.	To rough grind a high-speed steel lathe tool	1.	Coarse aluminum oxide
_____b.	To rough grind a cast iron part	2.	Coarse silicon carbide
_____c.	To rough grind a part made of hardened tool steel	3.	Fine aluminum oxide
_____d.	To finish grind a high-speed lathe tool	4.	Fine silicon carbide
_____e.	To finish grind a carbide tool bit	5.	Medium silicon carbide
_____f.	To finish grind a part made of cast iron		
_____g.	To sharpen a carbide tool		
_____h.	To sharpen a high-speed drill		

3. Describe care and storage of grinding wheels in the spaces below.

a. Dressing -- _____

_____

_____

b. Storing thin wheels -- _____

_____

_____

c. Speed -- _____

_____

_____

d. Paper washers or blotters -- _____

_____

_____

e. Starting large wheels -- _____

_____

_____

f. Trueing -- _____

_____

_____

g. Tightening -- _____

_____

_____

h. Balancing large wheels -- _____

_____

_____

i. Ringing -- _____

_____

_____

4. Match grinding problems to their possible causes and corrections. Write the correct numbers in the blanks. Some blanks may have more than one answer.

1. Burning of workpiece
2. Wheel slows or stalls
3. Wheel corner breakdown

_____a. Cause -- Wheel too hard
Correction -- Use softer grade and/or coarser grit wheel

_____b. Cause -- Not enough pressure
Correction -- Increase amount of pressure or reduce contact area

_____c. Cause -- Wheel too soft
Correction -- Use harder grade wheel

_____d. Cause -- Pressure too high
Correction -- Reduce pressure or reduce contact area

_____e. Cause -- Wheel too coarse
Correction -- Use finer grit wheel

_____f. Cause -- Wheel face loaded
Correction -- Dress to open wheel face

_____g. Cause -- Belt slippage
Correction -- Adjust and retighten belts

_____h. Cause -- Worn spindle
Correction -- Check spindle run out and correct

5. Name five jobs that are pedestal grinder operations.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

6. Stop. Have your instructor evaluate your Assignment Sheet. If your instructor is satisfied with your performance, continue to LAP Step 7. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to LAP Step 7.

PEDESTAL GRINDER
UNIT II

LAP ASSIGNMENT SHEET #3--PEDESTAL GRINDER SAFETY

NAME _____ SCORE _____

1. State rules that apply to safe use of the pedestal grinder.

a. Starting -- _____

_____

b. Tool rest and spark breaker -- _____

_____

c. Eyes -- _____

_____

d. Pressure -- _____

_____

e. Non-ferrous materials -- _____

_____

_____

f. Adjustments -- _____

_____

g. Gloves -- _____

_____

h. Respirator -- _____

_____

i. Excessive vibration -- _____

_____

j. Face of grinding wheel -- _____

_____

k. Side of wheel -- _____

_____

l. Glazing -- _____

_____

_____

m. Glazed or loaded wheel -- _____

_____

n. Horseplay -- _____

_____

o. Guards -- _____

_____

_____

p. Heat -- _____

_____

q. Electrical switches -- _____

_____

2. Stop. Have your instructor evaluate your Assignment Sheet. If you score 100 percent, continue to LAP Step 11. Otherwise, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to LAP Step 11.

PEDESTAL GRINDER
UNIT II

LAP ASSIGNMENT SHEET #4--INTERPRET COMPOSITION OF GRINDING WHEELS

NAME _____ SCORE _____

1. Label the type of information given about grinding wheel composition by each letter or number group in the wheel identification number below.

   a. 32A -- _____

   c. 46 -- _____

   d. H -- _____

   e. 8 -- _____

   f. V -- _____

2. Use the following chart to describe the composition of the grinding wheels listed on the next page.

NORTON SYMBOL

Letter or numeral or both to designate a variation or modification of bond or other characteristic of the wheel. Typical symbols are "P," "G," "BE."

GRIT SIZE

Coarse	Med	Fine	Very Fine
10	30	70	220
12	36	80	240
14		90	280
16	46	100	320
20	54	120	400
24	60	150	500
		180	600

STRUCTURE

The structure number of a wheel refers to the relative spacing of the grains of abrasive; the larger the number, the wider the grain spacing.

BOND TYPE

V = Vitrified

B = Resinoid

R = Rubber

E = Shellac

GRADE

Soft	Med	Hard
AE	IM	QV
BF	JN	RW
CG	KO	SX
DH	LP	TY
		UZ

ABRASIVE

	Alundum	=	A
16	Alundum	=	16A
19	Alundum	=	19A
23	Alundum	=	23A
32	Alundum	=	32A
38	Alundum	=	38A
53	Alundum	=	53A
57	Alundum	=	57A
66	Alundum	=	66A
68	Alundum	=	68A
76	Alundum	=	76A
NZ	Alundum	=	NZ
ZF	Alundum	=	ZF
ZS	Alundum	=	ZS
37	Crystolon	=	37C
39	Crystolon	=	39C
74	Crystolon	=	74C

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a. 16A54 - N10E

b. NZ14 - W8VBE

3. Stop. Have your instructor evaluate your Assignment Sheet. If your instructor is satisfied with your performance, continue to LAP Step 15. If additional study is required, discuss a study program with your instructor. Once you have completed that program to your instructor's satisfaction, continue to LAP Step 15.